Light and Lighting

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The official journal of the Illuminating Engineering Society.

Farewell and Hail

THE passing of King George VI came as a shock and a disappointment to all members of what, in his last Christmas message, he called "the great and diverse family of the British Commonwealth." He was called to reign in troublous times, and he dignified the Monarchy by his uprightness, his selfless devotion to the manifold, and often arduous, duties of his high office, and the example he gave of manful, resolute determination to overcome personal difficulties. It is a sad thought that his last ordeal was endured in vain; a consoling one that death came to him in kindly fashion. To him, the peace "that passeth all understanding": to us, the grateful memory of a valiant King.

To his successor, Her Majesty Queen Elizabeth II, and to our gracious Queen Mother, we offer our sympathy for their loss. To the Queen herself we tender our humble duty. Of her capacity and will to be a worthy occupant of the British Throne there has been ample proof already. Already, too, she has endeared herself to that world-spread family of free men and women who now acclaim her their Sovereign Lady. Long may she reign over us, God Save The Queen!

Notes and News

A Diploma in Public Lighting

Some fifteen years ago the Association of Public Lighting Engineers were considering the establishment of a diploma in public lighting to be awarded on the results of an examination conducted by the City and Guilds of London Institute. Now the proposal is being revived in a different form and the Council of the Association have put forward a scheme for a diploma to be awarded by them "as an indication of a professional standard in public lighting." Candidates must have passed (a) the Common Preliminary Examination of the Engineering Joint Examination Board, or its equivalent, (b) an appropriate Ordinary National Certificate or similar examination and (c) the Intermediate Grade Examination in Illuminating Engineering of the City and Guilds. In addition, five years' practical experience, either in a public lighting department or in the design of installations or equipment, is required.

The examination is to be both written and oral. The former will be by means of two papers, one on the technology of public lighting, the other partly on ancillary technical matters and partly on administration. The content of the oral examination is not stated and it may therefore be presumed that it will cover the same ground as the written part.

The difficulties likely to be met with in operating a scheme of this kind are very great. Two of the principal ones are mentioned, viz., the need for suitable textbooks and the provision of courses of study accessible to the majority of potential students. Both these difficulties were encountered immediately the scheme for examinations in illuminating engineering was launched and the cause is evident, viz., the small number of students concerned.

The more specialised the subject the greater the difficulty experienced by a student in finding suitable classes, except in the very largest centres of population, and this very fact brings up a fundamental question which should be faced by any responsible body of specialists before they sponsor a scheme of this kind. The question is, "Should students be encouraged to specialise to the extent needed for success in a diploma scheme such as that proposed by the A.P.L.E.?" or, put another way, "Should not a student who has, say, the Ordinary National Certificate in Electrical Engineering be encouraged to proceed further along the same well-recognised lines, leading ultimately to an acknowledged professional qualification, instead of narrowing his interests to a field in which the range of opportunity is strictly circumscribed?"

Surely the object of any educational scheme is to extend the range of knowledge of the student beyond his practical

Next I.E.S. Meeting in London

The next I.E.S. Sessional Meeting in London will take place at the Lighting Service Bureau, 2, Savoy Hill, W.C.2, at 6 p.m. on Tuesday, March 11.

At this meeting a paper entitled "The Lighting of Shipyards" is to be presented by Mr. J. S. McCulloch. The first part of the paper is devoted to a discussion of the lighting requirements for interior and exterior lighting in the various sections of a shipyard. The latter part of the paper shows how the problems involved have been dealt with in a number of typical shipyard installations.

experience. To exemplify from the particular field now under consideration, may it not well happen that a Borough Engineer who wishes to engage someone to take special responsibility for the public lighting work of his department will prefer a candidate with, say, the Graduateship of the I.E.E. or even the Higher National Certificate, combined with practical experience in a public lighting department, to one whose studies have covered more or less the same ground as his practical work?

It will be interesting to watch the development of the scheme. There can be no doubt that the conduct of examinations by a body not primarily educational in function throws a heavy additional burden on its administrative staff and it was for this reason, among others, that the Illuminating Engineering Society decided against any examinations in illuminating engineering unless these could be organised by an established body with long experience in such work and with an accepted position in the educational world.

I.E.S. Papers

An account is given elsewhere in this issue of the amusing evening on the preparation and presentation of a technical paper recently arranged by the I.E.S. Papers Committee but we would like to put a little more emphasis on the purpose behind the excellent production and performance with which we were entertained.

The I.E.S. exists to discuss matters of lighting which are of interest to its members, and to disseminate information about lighting. These purposes it fulfils by the Sessional meetings at which papers are discussed, and by the Transactions in which the text of these papers is printed together with a number of contributed articles. The quality of this material, therefore, determines the quality of the Society; and one of the functions of the Papers Committee is to maintain this quality.

But the system works also in reverse. The quality of the material which can be published is determined by the quality of the Society. A flow of good and authoritative papers cannot be maintained unless there is sufficient good, original thought going on in the lighting profession. Lighting is a matter in which the commercial interest probably exceeds the technical interest; there is therefore a tendency for the subject to be over-written. Every member of the I.E.S. needs, both for his own sake and for the Society's sake, to bring to his job an alert, questioning and original mind; and when he has reached some worth-while conclusion, to write it down for the benefit of others.

The Papers Committee has a double function: it exists to maintain the standard of publication for the benefit of readers, and to help writers to express their material in the most telling way. It does what it can with the material which it receives but it is seriously hindered by a shortage of papers, for unless there are a few papers on the waiting list it can do little about an unsatisfactory or a delayed paper.

The Papers Committee prefers that any ideas for a new paper should be sent to it in *summary* form, about 200-300 words giving the probable scope of the paper and an idea of the way in which the subject would be tackled. From this it can judge whether it is worth pursuing and can indicate aspects which might be stressed before the author has spent time writing a complete manuscript.

New material and new writers are required. The standard is high enough to put anyone on his mettle, but not so high that only experts can reach it. The subject is wide, and there are many opportunities for constructive, original approaches to old problems which we still tackle conventionally because no one has thought sufficiently about them to find a better way. Original work is not only laboratory or experimental work. It is the result of a questioning mind applied to any lighting job, whether in the laboratory, or in the lighting of a home, or a hospital, or a chicken run.

Spotlights are used to illuminate the attractive window display in this new extension to a London shop.

A Study of Daylighting In a Model Hospital Ward

By J. LONGMORE

The following article gives a detailed description of the experiments in the daylighting of hospital wards, a general description of which was given in a recent issue.

The salient features of an investigation recently carried out at the Building Research Station were described by Mr. D. J. Petty in his article published last month. The object of the investigation was to study the distribution of daylighting in an improved form of ward layout proposed by the Nuffield Provincial Hospitals Trust(1). Mr. Llewelyn Davies, in his paper to the Building Research Congress(2) in September last year, described this ward in detail. The plan is a complete departure from the conventional "Nightingale" ward and the unusually wide building resulting from its use raises the problem of adequate daylight penetration.

In this case it was doubtful whether adequate natural light could be provided for the patients in the inner beds of the Nuffield ward without discomfort from glare being caused to the patients in beds near the windows.

Problems of this kind are amenable to accurate study by means of models, since reduction of scale does not alter the reflection or transmission characteristics of light.

The Model Ward

A model of a section of the ward was constructed to a scale of 1 in. to 1 ft. The ceiling could be raised or lowered and the windows and internal walls were made removable, to enable comparative measurements to be made with different ceiling heights, wall formations and window designs. Panels in the floor were also made removable to enable observers to inspect the lighting conditions from within the model.

The walls and ceiling were painted matt white, of 83 per cent. reflection factor, but the floor was left natural wood, of 36 per cent. reflection factor, because it was considered unlikely that a much lighter floor would be achieved in practice.

Accurate daylighting studies normally require that the sky be completely overcast and that its brightness distribution should not change appreciably during the course of the experiment. A prolonged and detailed investigation, such as was envisaged, would thus be extremely difficult under natural conditions, and it was therefore decided to construct an artificial sky for use with the model.

In daylight factor measurement the natural sky is assumed to be a hemisphere of infinite radius, extending down to the horizon. This principle cannot however be conveniently applied to an artificial sky of limited dimensions, and an alternative conception of the sky is as an infinite horizontal plane, either at the same level as the ceiling or at any convenient distance above it. The sky will not therefore be visible from points on the ceiling and such points will not receive any direct light from it.

As can be seen from Fig. 1 the model ward had windows in two parallel walls only, and it was thus convenient to use two artificial skies, one for each window-wall. Two horizontal artificial skies were designed, using materials readily available in the laboratory, e.g., 6 ft. x 2 ft. opal "Perspex" sheet, and 5 ft. 80-watt "Daylight" fluorescent lamps. These were fitted into wooden boxes, 12 in. deep, in such a way as to make the brightness of the "Perspex" appear uniform when viewed from points inside the model. A wooden panel on the end of the box could be removed, enabling the lamps to be withdrawn and quickly

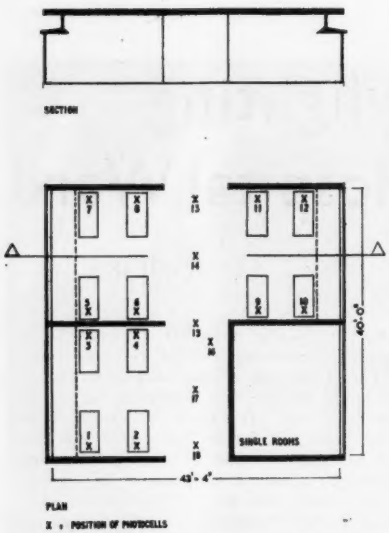

Fig. 1. *Plan and section of the experimental ward.*

replaced. The lamp auxiliary gear was mounted externally on the other end, for ventilation and accessibility.

These "skies" were not ideal. They were limited in size by the dimensions of the "Perspex," and, to simulate a continuous plane, a vertical reflector of white card was placed around the outside edge. A further sheet of card was placed horizontally below the "Perspex" to represent the ground.

Some photometric measurements were made of the relative brightnesses of typical natural ground surfaces, e.g., soil, grass, trees, stone and brickwork, at various distances, and the average reflection factor value on an overcast day which was applicable to the present problem was found to be approximately 10 per cent. Calculations showed that if the reflection factors of the vertical card and ground were made 75 per cent. and 5 per cent. respectively, the distribution of light within the ward approximated closely to that obtained naturally on an overcast day.

As a check before making detailed measurements, a number of preliminary surveys were made out of doors under the natural sky, and compared with similar surveys made using the artificial skies. Measurements were made exposing one window at a time to the north sky, where the model was free from obstructions. The results obtained with the artificial sky agreed with those for the natural sky to within $\pm$ 15 per cent.

The two artificial skies were compared, and the results proved that the illumination

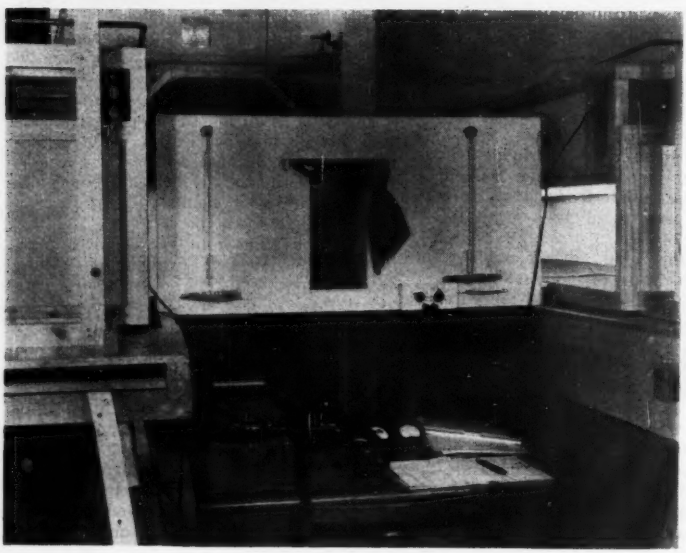

Fig. 2. *General view of the apparatus.*

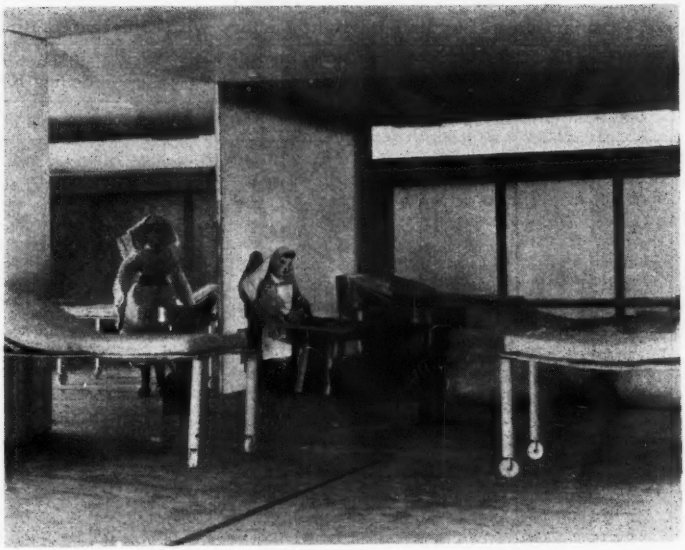

Fig. 3. Interior of the model showing cosine-corrected photocells.

from each was the same, within ± 5 per cent., not only at one point, but at all points throughout the ward.

These check measurements demonstrated that the experimental design was sufficiently representative of natural conditions to permit the detailed studies to be made with the artificial skies.

Photometric Techniques

Figure 2 is a general view of the apparatus and shows the positioning of the skies relative to the model. The skies were mounted on stepped blocks to enable them to be raised or lowered to correspond to the height of the ceiling.

Measurements of illumination and hence daylight factor were made in the ward using a number of small (37 mm. x 16.5 mm.) rectangular selenium rectifier photo-cells. Figure 1 provides a key to the positions of the cells. These were chosen as significant points in the work of the hospital ward. Twelve were at bed-heads and the remainder lay along the centre-line of the ward. Measurements were made only in the L-shaped part containing the beds, the remaining area being two single rooms. The cells were mounted in holders which could be plugged into sockets in the floor, locating them in the required positions, and in a 3 ft. high working plane corresponding to the height of a patient's head.

The sockets were wired to a rotary selector switch, enabling the cells to be rapidly connected in turn to a sensitive micro-ammeter, and a complete illumination survey to be made in a matter of minutes. (Care was taken to ensure good contact between all the points in the electrical circuits.)

Calibrations were made on a photometer bench and the normal response of each cell was plotted against illumination from a substandard lamp. The cells were subject to a deviation from true cosine response and corrections were made to all readings. More recently cells fitted with an automatic correction have been used. These are shown in Figure 3.

The lamps in the artificial skies were connected to a manually controlled voltage supply by means of which the output from a monitor photocell, mounted below each sky, was maintained constant.

Results:

(1) *The Effect of Ceiling Height*

Sky factors were computed, using B.R.S. Protractors (3) at each photocell position, with three different ceiling heights, and with completely unobstructed window-walls. The figures obtained are compared in columns 2 and 3 of Table 1.

Daylight factors measured with the same

Table 1

Comparison of Sky and Daylight Factors with Different Ceiling Heights

Position of Photocell (See Fig. 1)	Sky Factor per cent. Ceiling Height		Daylight Factor per cent. Ceiling Height	
	10 ft. 0 in.	12 ft. 0 in.	10 ft. 0 in.	12 ft. 0 in.
1	10.9	13.7	28.3	29.3
3	10.9	13.8	27.0	27.8
5	11.1	14.0	30.0	30.2
7	11.1	14.0	27.3	28.4
10	11.1	14.0	29.0	29.6
12	11.1	14.0	28.3	29.6
2	2.1	3.2	11.3	12.7
4	2.4	3.7	11.2	12.5
6	2.5	3.9	13.2	14.2
8	2.5	3.9	11.8	13.4
9	2.9	4.4	12.7	14.7
11	2.5	3.9	13.6	15.6
13	1.7	2.8	9.3	10.7
14	2.0	3.2	10.6	12.2
15	2.2	3.5	9.8	11.3
16	1.0	1.7	7.2	8.0
17	1.0	1.6	8.6	9.5
18	0.9	1.4	8.2	9.0

NOTES.—White Ceiling and walls, reflection factor 83 per cent.
Wood Floor, reflection factor 36 per cent.
Clear Windows.
Black Curtains over openings near positions 13 and 18.

ceiling heights are compared in columns 4 and 5. In each case the ceiling and all wall surfaces were painted matt white with a reflection factor of 83 per cent., and the floor was plain plywood of 36 per cent. reflection factor. The floor was not painted white as this would give a result not normally attainable in practice. The window was a sheet of 3/16 in clear Perspex.

From the results obtained it is seen that, as the ceiling height is reduced from 12 ft. to 10 ft., the daylight factor does not fall in proportion to the sky factor provided the average reflection factor of the walls, ceiling and floor is kept relatively high.

It will be seen that, particularly at points far from the windows, the sky factor, or direct light entering the room, is considerably increased with increase in ceiling height and the corresponding increase in window area; but that the net gain in terms of integrated illumination, or daylight factor, is so small as to be almost negligible.

This is explained by the fact that as the area of the window is increased it not only admits more light into the room but it allows more light to escape out again. It is essential, therefore, in daylight factor studies to consider the room as an integrator of light. The window, if of clear glass, may be regarded from inside the room as an area of black wall, absorbing all light falling on its surface, and therefore greatly reducing the integrating effect of the room as a whole. This, in turn, results in a reduction of the proportion of light reflected from the walls, ceiling and floor.

Thus an increase in window area will not produce a proportional increase in daylight factor. It is interesting to note that an increase in window area below the working plane will not increase the sky factor, though it may effect a considerable increase in the daylight factor, due to light reflected from the floor and to light from the ground outside reflected from the ceiling. It is often insufficiently realised that an extended area of ground acts as a useful source of light (reflected, of course, from the sky or the sun), and to make the most use of this light

low windows are necessary. By definition such window openings below the working plane do not affect the value of the sky factor, but they materially influence the daylight.

(2) *Window Design*

Only one design of window was studied in detail in the model. The principal feature of this design is a "baffle," or horizontal fin, extending 3 ft. 4 in. into the ward at a height of 7 ft. 4 in. from the floor. The purpose of the baffle is to reduce discomfort glare by reducing the area of sky visible from beds near the window, while causing little or no obstruction at points farther into the room.

The model was large enough to receive a person's head through openings in the floor, and the glare effects were observed directly. The effect of the window on the distribution of light within the ward was measured by means of the photo-cells.

(3) *The Contributions of the Walls, Ceiling and Floor*

The walls, ceiling and floor of the model were divided up into what were considered to be the 16 major components of any scheme of decoration, and the contribution of each to the daylight factor at any point in the ward was measured.

These component internal surfaces of the model were covered with black card one at a time, and the reduction in illumination produced by each alone was measured. This reduction is due to the removal of all light which was reflected by that surface, either directly or indirectly via other surfaces.

Several interesting points arise from the results obtained. From the figures given in Table 1 it is seen that if the ceiling is black, and reflects no light, it considerably reduces the illumination within the ward, particularly at points far from the windows, where the reduction is more than half. Similarly, if the floor is black it reduces the illumination at those points by more than one third. It should be noted, however, that the reflection factor of the floor was only reduced from 36 per cent., whereas the ceiling was reduced from 83 per cent.

It is also seen that, at positions 16, 17 and 18, with a window on one side only, the sky factors are approximately half those at positions 13, 14 and 15, which have windows on two sides, but the daylight factors are almost the same. This indicates that walls parallel to windows can be used to reflect light and considerably increase the level of illumination at points far from the windows, and for this reason they should be of a high reflection factor.

Having measured the maximum daylight factors obtainable with white walls and light-coloured floor, and found the contribution by reflection of the internal surfaces to the level of daylight in the ward, a method was evolved for predicting the daylight factor for any scheme of decoration. Calculations were made for a number of colour schemes, some of which were tried out in the model. Daylight factors measured for these agreed very well with the predicted values.

The colour schemes were designed to give visual comfort to the patients and staff. The visual comfort requires a gradation of lightness from the bright sky to the darker areas

Table 2
Daylight Factors Measured in Decorated Model Ward

Position of Photocell (See Fig. 1)	White Walls and Ceiling, Natural Wood Floor	White Ceiling Grey Walls (White Window) Cork Floor
1	14.6	11.3
3	13.8	10.9
5	14.3	11.7
7	13.8	10.0
10	15.7	12.8
12	15.8	12.5
2	5.8	3.4
4	6.0	3.8
6	7.2	4.7
8	6.6	4.2
9	7.6	4.5
11	7.8	5.1
13	5.0	3.2
14	6.2	3.9
15	6.2	3.9
16	5 6	—
17	5.0	3.2
18	3.7	2.3

NOTES.—The "baffle" type window with 10 ft. 0 in. ceiling was used in each case.
Reflection factors :—
Ceiling and white walls 83 per cent.
Grey Walls 44 per cent.
Wood Floor 36 per cent.
Cork Floor 18 per cent.
Black curtains over openings near positions 13 and 18.

within the ward (the "contrast grading" effect described and measured by the Building Research Station(4)); the window frames and horizontal baffle having a high reflection factor.

These various colour schemes were studied in detail in the model by inspection, and it was considered that the most pleasing effect resulted from one with quite a low reflection factor. The daylight factors measured with this colour scheme are given in column 3 of Table 2, where they are compared with similar results obtained with white walls. The reflection factor of the floor was reduced to 18 per cent., this being the reflection factor of a cork floor which it is proposed to use in the experimental ward unit at Greenock. The introduction of white beds was found to have very little effect. They tended to increase the illumination by a maximum of 3 per cent. near the window and similarly reduce it in the middle of the ward.

These values were considered adequate. If the outdoor illumination is 500 lm./ft.^{2} the illumination at the inside bed will be 16 to 23 lm./ft.^{2}. The National Physical Laboratory has shown that the number of days, when the illumination outdoors in Edinburgh is less than 500 lm./ft.^{2} at midday, is 26 (5).

In the past the difficulties (6) of predicting accurately the daylight factor or total amount of natural light in a room have been so great that calculations have been made only of the sky factor, or direct component. The indirect component, or interreflected light, has been regarded as a margin of safety and no great importance has been attached to it. However, with the modern trend towards higher levels of illumination, large windows and light-coloured walls to reduce glare, reflected light has become increasingly important, and some simple method of prediction is required.

The results given in this paper solve the problem for one particular type of room, but obviously have applications well beyond the confines of hospital planning. Work is continuing at the Building Research Station on specific types of school classroom, and a fundamental study is being made of interreflections in rooms in general.

The work described in this paper was carried out at the Building Research Station, and is published with the permission of the director.

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The Colour Group

The meeting of the Physical Society's Colour Group, held on January 9 at the Institute of Ophthalmology, was a long one devoted to the presentation and discussion of two papers dealing respectively with quite different aspects of colour vision. The first was by Prof. W. D. Wright, who reported on some very recent work on a comparatively rare form of colour vision defect, tritanopia, in which blues and greens are confused, instead of reds and greens, as in the more common forms of defect. Last spring the journal "Picture Post" published a descriptive article on colour blindness and included a colour reproduction of some of the confusion charts used to detect the condition. At Prof. Wright's suggestion they included a chart designed to pick out tritanopes, vaguely estimated to number about one in a million of the population. Those who could not detect the appropriate pattern in the confusion chart were asked to communicate with Prof. Wright and, as it was estimated that each issue of "Picture Post" was read by about 9,000,000 people, the expected mail was about nine. In fact, it was about 900, of which only a fraction proved to be true tritanopes.

The second paper, on "Light- and Dark-Adaptation and the Perception of Colour," was by Mr. R. W. G. Hunt, of Kodak, Ltd. He described an investigation, on two observers, of the changes in colour perception caused by large changes in the luminance of the light to which the eye was adapted. He found a gradual increase in the saturation of colours as the adapting light intensity was raised, and that increasing the test colour intensity caused increases in saturation at low levels of adaptation, although at high levels there was a tendency for most colours to become bluer.

Fluorescent Lighting in the Printing Industry

By H. WEST

Those familiar with the printing industry will be aware of the need for good lighting. The following article deals with the application of fluorescent lighting to a number of the processes involved.

Good lighting in the printing industry is of paramount importance, serving as it does practically every need of to-day, coupled with the high speed with which it has to function. The purpose of this article is not to cover the whole of this industry's varied needs, but merely to draw attention to several of the more important branches and include special features based upon personal investigation.

In this country, recommended values of illumination for printing, as put forward by the Illuminating Engineering Society in their I.E.S. Code, are as follows:—

Matrixing and Casting, Miscellaneous Machines, Presses	10 lm./ft.^{2}
Proof Reading, Lithographing, Electrotyping, Linotype, Monotype, Typesetting, Imposing, Stone Engraving	20 lm./ft.^{2}
Type-setting by hand (up to 6-Point type), Setting Tabular and Mathematical Matter	30 lm./ft.^{2}
Sorting and Packing	7 lm./ft.^{2}

Let us first consider some of the problems associated with type-setting by hand as opposed to machine-setting. When a printer is working with clean type he is dealing with a metallic mirror on which is the character; that is to say, the raised face of the type which is slightly higher than the shoulder. These shoulders, or flat, depressed portions, act as a mirror against which the type characters must be silhouetted if they are to be seen Reflected glare from the minute fillets and rounded corners of the type face, acting as concave and convex mirrors, is a common source of annoyance. By using a low brightness source having a large luminous area as typified by the fluorescent lamp, glare is minimised, and is therefore ideal for the composing room.

The Composing Room

Where large composing rooms are to be illuminated the 5-ft. 80-watt fitting will be best suited, and it is suggested that they be mounted above the inclined benches at a height of 8-9 ft. from floor level and parallel with the major axis of the bench.

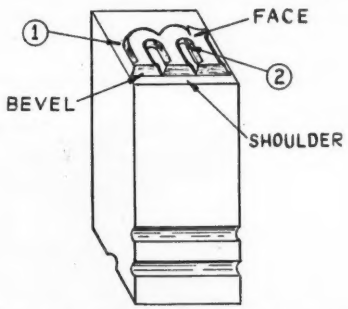


Fig. 1. *Piece of type showing how the edges of the character act* (1) *as a convex mirror and* (2) *as a concave mirror.*

In certain cases, however, it may be necessary to position the fittings across the bench for reasons of symmetry.

Figs. 2 and 3 show two alternative methods of lighting for the composing room. Note the use of open-top units in the first, providing upward illumination,

Fig. 2. Lighting in a composing room by means of open-top fittings.

which is to be recommended for psychological reasons.

In the second photograph will be seen work being carried out on galleys (left-hand side), whilst corrected proofs are being studied by the supervisor who is standing by the imposing table, with a hand-proof press in the right foreground.

Imposing—this term implying the locking up of formes of type in position and generally refers to the arrangement of page layout in the case of a book so that they fall into the required sequence—is all-important. It is essential that the lighting unit should have a low uniform brightness and be suspended low enough so that the entire forme is illuminated without interference to the worker.

Fig. 3. Showing alternative method of lighting a composing room.

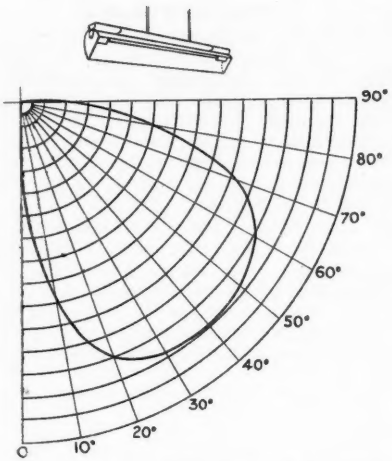


Fig. 4. Typical polar curve of 80-watt parabolic angled fitting showing light control.

of the Monotype composing machine. Normal practice is to equip a small low-wattage incandescent lamp with a "shell"-type reflector adjacent to the keyboard, conveniently screened from the eyes of the operator. When arranging fluorescent lighting for these machines it will be found more desirable to depart from this primitive lighting and to adopt a localised general system whereby use is made of angled type fittings projecting the main beam on to the copy-stand and keyboard, the units being positioned directly behind the machine operator.

A polar diagram and illustration of a suitable 80-watt parabolic angled type fluorescent fitting as recommended for the lighting of the above-mentioned machines is shown in Fig. 4.

Press Rooms

The diagram (Fig. 5) depicts an ideal arrangement of lighting for a typical press room where the majority of the machines are high-speed two-revolution Miehles, although a few Wharfedale types are also

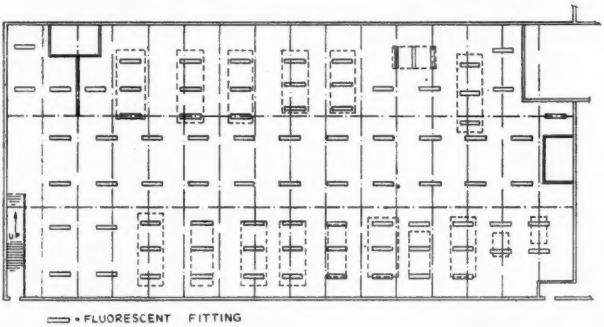


Fig. 5. Typical fluorescent lighting layout for press-room.

Mechanical Type-setting

Mechanical type-setting machines can be divided into two main groups: (1) Slug-casting machines, producing an entire line on one body, and (2) single-type casting machines, called Monotype, which produce the lines of type justified to measure but with each character and space on a separate body.

Dealing with the former — Linotype machines—the operator reads his "copy" from a stand situated on the left of the keyboard whilst manipulating the keys. So far as lighting is concerned, the copy-stand is the important part of this machine and installed. Fig. 6 is a diagrammatic sketch of a high-speed Miehle depicting the normal method of mounting a lighting fitting over both the feed and delivery ends, together with one over the centre of the machine. Notice that the fluorescent units should be installed at right angles to the major axis of the machine, a mounting height in the region of 10-11 ft. being most satisfactory.

One important feature is the addition of a local lighting unit of the trough type and shallow in depth underneath the machine at the feed end to illuminate the bed of the press. By reason of the presence of overhead structures no general lighting will penetrate sufficiently to enable the press-

man to carry out any adjustments. A 3-ft. 30-watt fluorescent lamp normally will suffice for this purpose.

It is interesting to note that modern, German-made "Heidelberg" machines now being imported into this country already have this integrally fitted low-wattage fluorescent equipment beneath the feed boards. The trough reflector is narrow across the mouth with button-type bi-pin lampholders incorporated to reduce the height of the unit. The control gear is housed separately on the side of the press together with other electrical apparatus used for the working of the machine.

In well-planned large printing establishments engaged mainly upon the printing of books, stacks of paper usually are positioned in the centre of the press-room with the machines located on either side, delivery ends towards the centre. Gangway lighting in this central area at a level of 8-10 lm./ft.^{2} should be adequate for both the paper stacks and general illumination.

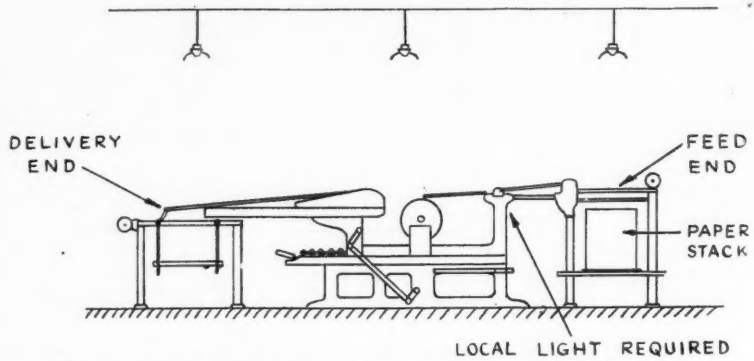


Fig. 6. Typical lighting arrangement over high-speed Miehle machine.

Tabular Work Machines

Experience has shown that, in the case of tabulating machines used for ruling purposes, if the fluorescent units are placed parallel to the minor axis of the machine, shadows are thrown by the overhead structures. It would be found desirable to site the lighting fitting at an angle of 45 deg. across the machine, thereby eliminating this trouble and ensuring uniform illumination of the ruling equipment.

Make-Ready Stands

A special installation recently employed in a large printing works involved the lighting of the make-ready or "patching" boards. These stands are just over 5 ft. high, inclined on both sides and the lighting required to be directed at a very oblique angle so as to illuminate only the copy matter requiring make-ready treatment. No glare should be evident.

The solution of the problem is depicted in Fig. 7 and consists of a special local lighting fitting with a narrow cut-off reflector. These fittings comprise circular section sheet metal bodies with a 4-in. aperture at the base and are designed to house either 3-, 4- or 5-ft. lamps. For this particular situation

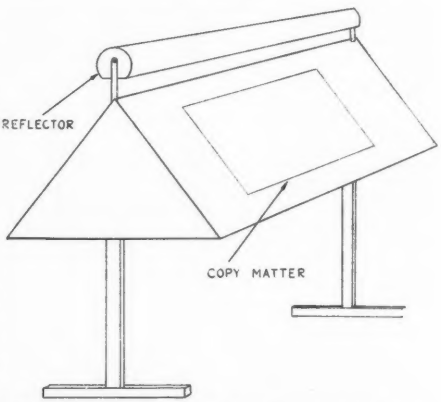


Fig. 7. Special local lighting treatment for a "make-ready" or "patching" board.

the 3-ft. lamp is used and, in order to ensure maximum cut-off, the lamps are mounted as close as practicable to the top of the fitting. The control gear is housed beneath the board framework with the wiring leads coming up through the fitting supports.

The Reading Department

One of the most important jobs in printing is that of proof-reading and particular attention should be paid to the position of the proof-reader. Reading entails a great strain on the eyes and therefore the lighting should be of the best. Undoubtedly totally indirect lighting will be found best suited for this task provided that a high level of illumination is put forward. Should indirect lighting not be possible the usual industrial-type fittings mounted at a height of 3-4 ft. above the working plane and positioned immediately over the bench is to be advocated. Alternatively, if the light can be directed from just behind the proof-reader so that it falls over his shoulder, reflected glare will be avoided. In either case a high standard of lighting in the order of 25-30 lm./ft.^{2} is to be advocated so as to eliminate errors as far as possible whilst maintaining the speed which is so essential, especially in the newspaper trade.

Colour

Experience has shown that the fluorescent lamps best suited to the printing industry are the "Daylight" and "Northlight" (Colour Matching) types. For most locations, with the exception of colour printing, the "Daylight" lamp, giving the greatest lumen output per watt, is more suitable. In colour printing, where accurate colour rendering is essential, the "Northlight" lamp is to be preferred in spite of the slight sacrifice in efficiency. However, the ideal arrangement is a combination of fluorescent and incandescent lighting which will result in a close approximation to natural daylight conditions in a factory with "northlights." It must be stressed that in the colour-printing section of the factory the lighting should be identical to that in the room where the ink is mixed.

For night runs accurate colour printing can still be maintained using the "Northlight" lamp. In point of fact the risk is less than with what we term "natural daylight" conditions by reason of the change in weather, season or other conditions since these do not remain constant.

A further development which is rapidly achieving importance to-day is the part played by colour of the walls, ceiling and machines or other equipment. The addition of a better light source in a dark painted composing-room will not necessarily produce a good lighting installation. If the lighting engineer is to do his work properly he must see that, if high levels of illumination are to be used, the brightness ratios between the work and the surroundings are reduced.

In conclusion the author would like to express thanks to members of the printing industry for certain information contained in the article, to his colleagues for their helpful criticism, and to Thorn Electrical Industries Limited for permission to use the two photographs shown.

Trade Literature

BENJAMIN ELECTRIC LTD. New booklet on history and manufacture of "Crysteel" vitreous enamel used for almost all Benjamin reflectors.

COURTNEY, POPE (ELECTRICAL) LTD. Latest of new series of catalogues giving full details, prices, etc., of range of window and display lighting fittings.

GENERAL ELECTRIC CO. LTD. Leaflet on Osram fluorescent lamps and starter switches. Details on coloured lamps include recommended applications.

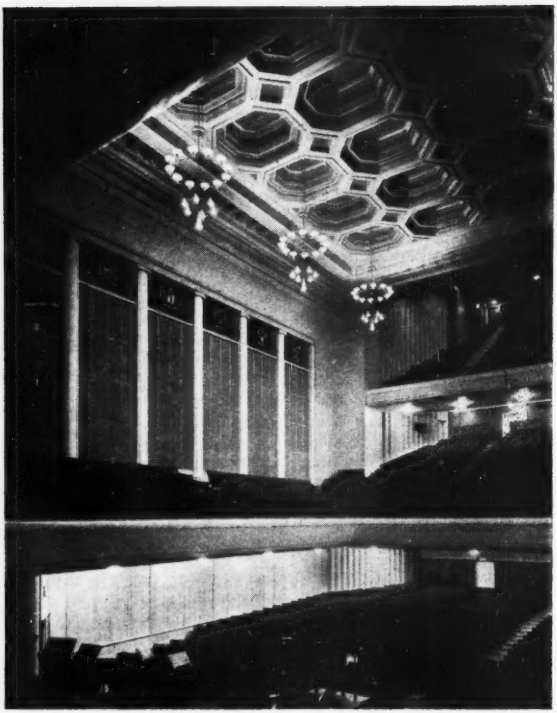
LINOLITE LTD. Two new leaflets: No. R.8, which gives details of the complete range of Linolite reflectors and filament tubular lamps, and No. S.9, which describes the Linoglas internal reflection sign and small box-type direction sign.

PHILIPS ELECTRICAL LTD. Literature received includes a new leaflet on "Photoflux" flashbulbs for photography, and a booklet entitled "In the Service of Industry." This illustrates the contribution made by the firm to modern industry. Also recently published is a special lamp catalogue, including details on projector and floodlighting lamps, "Photoflux" flashbulbs, and photographic lamps, and a leaflet on "instant-self-start" fluorescent lighting fittings.

SIMPLEX ELECTRIC CO., LTD., has issued a new specification folder on commercial lighting fittings.

STELLA LAMP COMPANY LIMITED. A new general lamps catalogue, containing full details, list prices, photographs, and line drawings.

The Free Trade Hall



The original Free Trade Hall at Manchester was destroyed by fire during the war. This article describes the lighting in the reconstructed hall.

The reconstructed Free Trade Hall, Manchester, which was recently opened, was almost entirely rebuilt after the original hall was destroyed by fire in an air raid in December, 1940. In reconstructing the hall, the Architect's Department of the City of Manchester, under the direction of Leonard C. Howitt, F.R.I.B.A., had the opportunity to provide greater seating capacity with improved circulation and foyer areas, and other improvements, bearing in mind the possible uses to which the hall might be put.

Careful consideration was given to the lighting, and it was decided to use tungsten filament lamps throughout the building. The decorative lighting fittings in the large hall, the staircases, and the entrance arcade were specially designed and manufactured by Troughton and Young (Lighting), Ltd., who also supplied fittings from their standard ranges for the lesser hall and other positions.

Under the direction of A. B. Read, R.D.I. the six fittings in the large hall were designed to harmonise with the architectural details. not only of the heavily coffered ceiling, but also with the general layout of the interior of the hall. The effect produced is a fitting of a light, airy appearance, but still with sufficient bulk to be in scale with the hall. The actual quality of light was carefully considered to give an adequate intensity as well as an interesting pattern; each fitting has a loading of 1,950 watts.

Consideration had to be given to the raising and lowering of these fittings for maintenance, and in addition, due to the present restrictions on the use of brass and copper, different materials to those normally

used had to be considered. The fittings themselves consist of a central tube with three rings. The top ring is 8 ft. 7 in. from the ceiling, 1 ft. 4 in. diameter, and is fixed by struts to the central tube. This ring is used as a collecting channel for six rubber flexible cables from the ceiling plate, as well as for 12 flexibles to the middle ring and six to the lower ring. The middle ring is 5 ft. diameter, which is suspended 3 ft. 5 in. from the top ring, and on the outside are fixed 12 arms taking the 12 flexible cables from the top ring. Each arm has a glass bowl and a metal supporting cup perforated all over with small holes, housing a 100-watt lamp. The bottom ring is 3 ft. 1 in. in diameter and is suspended 2 ft. 10½ in. from the middle ring, from which are suspended conical reflectors perforated all over with small holes, each reflector housing a 100-watt lamp; the ring being supported by the six flexibles from the top ring. To finish off the base of the fitting the central tube terminates in a larger conical reflector, similarly perforated, housing a 150-watt lamp. The overall diameter of the fitting is, therefore, 7 ft. 4 in. and the overall suspension 17 ft. 9 in. The metal used is mainly aluminium, except for the structural parts which are steel. The aluminium is polished and lacquered on the rings, and the reflectors and cups are anodised gilt.

The lesser Hall.

General view of the restaurant.

Lighting in Public Buildings — Recent Installations

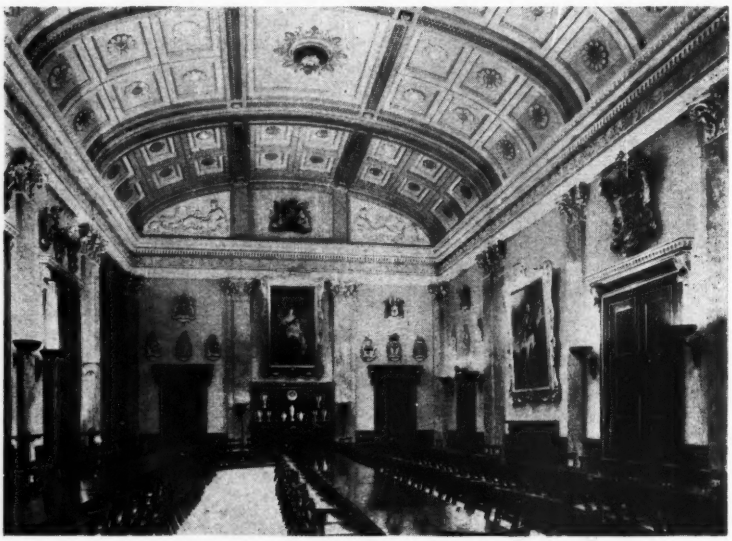
The two installations described below are both of tungsten lighting, and in each case a combination of indirect lighting and direct lighting through the ceiling has been used.

Fishmongers' Hall

The restoration of this fine building at London Bridge has been carried out under the direction of Messrs. Whinney, Son and Austen Hall, architects. The accompanying photograph illustrates the banqueting hall, which measures 73 ft. long, 37 ft. wide, and 33 ft. high.

The indirect component of the scheme is made up of 12 500-watt wall brackets and four 500-watt floor standards. Provision for the direct lighting was made by removing the centre from 16 of the decorative patera on the ceiling, thus leaving holes about 8 in. in diameter. One 200-watt reflector with concentric louvres lights downwards through each hole, while access to the reflectors is obtained from above the ceiling. An average level of illumination of 6/7 lm./ft.^{2} is given by the indirect lighting with an additional 4 lm./ft.^{2} from the ceiling lights.

The real beauty of the scheme is appreciated on those occasions when the tables are



Fishmongers' Hall. (By courtesy of the Fishmongers' Company.)

Third Church of Christ Scientist. (*By courtesy of the Board.*)

laid for a banquet. Whilst the indirect lighting shows to the full the magnificence of the decorations, the direct light gives a sparkle to the silver on the tables which is very striking.

The brackets and standards, incorporating Allom reflectors, were designed and manufactured by Messrs. Starkie Gardner, Ltd. The installation was carried out by Messrs. Tyler and Freeman, Ltd., electrical contractors.

Third Church of Christ Scientist, Curzon Street

The auditorium of this church measures 112 ft. long by 78 ft. wide, giving a floor area of 8,740 sq. ft. The maximum height is 44 ft. In considering the new lighting scheme it was decided after demonstration that an illumination intensity of about 5 lm./ft.^{2} was sufficient for normal requirements. Whilst favouring indirect lighting as a basic method, it was realised that in so large a building redecorations were unlikely to be carried out other than at long intervals. It was agreed, therefore, to introduce the combination of indirect with direct methods, as the latter would assist in maintaining the overall efficiency of the scheme.

An interesting feature of the installation is that, so far as fittings and reflectors are concerned, the whole of the apparatus is contained in an existing but disused ventilation system. On each side of the auditorium there were four grilles acting as intake openings for this old system, and these have been replaced by recessed louvre fittings, a speciality of Allom Brothers. Each fitting contains two 500-watt reflectors for Class B1 projector lamps, which throw their light through louvres on to the ceiling on the farther side of the auditorium. These eight fittings give half the desired illumination intensity.

Ten 500-watt direct lighting reflectors are fixed inside the old extract duct which runs the full length of the auditorium down the centre line of the ceiling. The light in each case passes through one of the 6-in-square holes of the decorative grille of the duct.

The photograph illustrates the uniformity of the lighting and shows the uninterrupted view of the architectural features of the church, which was not the case with the system of pendant fittings which the new installation replaced.

The architects of the building were Messrs. Lanchester and Lodge, and the electrical contractors Messrs. Electrical Installations, Ltd. Both installations are examples of recent work by Allom Bros, Ltd.

Lighting Pedestrian Crossings at Night

A series of experiments on the lighting of pedestrian crossings has recently been carried out at Lewisham on the road between Lewisham Clock Tower and the Town Hall at Catford, one of the busiest stretches of road, both as regards pedestrian and vehicular traffic, in London. The experiments were conducted by the Road Research Laboratory of D.S.I.R. in collaboration with the Ministry of Transport and the Lewisham Borough Council, and were originally intended to last for two weeks though it is understood that this period is to be extended for a further two weeks so that more opinions from road users may be obtained.

The experiments were made to discover an efficient method of making zebra crossings easily visible at night and at each of the 10 crossings used in the tests a different combination of a number of visual indications was used. The ideas which were tried out included lighting beacons, floodlights, illuminated studs, traffic signal lights and

(Above) General view of the crossing at Albion Way.

(Left) Motorists' view of the same crossing looking along Lewisham High Street.

special treatment of the black stripes of the zebra crossings.

At all of the 10 crossings the beacons were fitted with lamps so that the globe could be made to show either a steady or flashing amber light. Three of the crossings were fitted with overhead mercury or sodium floodlights as shown in the illustrations which are of the one crossing where all of the ideas were tried out together. Also at this crossing were the amber traffic lights and the illuminated road studs. The amber lights were fitted to a post on the central island and gave a flashing warning signal. The illuminated road stud was similar to those used on aircraft runways and projected about $\frac{1}{8}$ in. above the road surface and gave either a fixed or a flashing light. The black stripes on some of the crossings were given special treatment which roughened the surface so that they showed up darker under the street lighting.

It is as yet too early for any detailed results on the experiments. The opinions of a number of road users have, however, been obtained and are of interest. It is natural that at first there should be some confusion owing to the proximity of so many crossings lighted in different ways. It would seem that the Albion-way crossing (that illustrated here) is somewhat confusing in itself as all the various indications are used, though the general opinion seems to be that on account of the number of lights one can hardly fail to notice the crossing. Also where there are many types of crossing lights there is liable to be confusion with the lights from neon signs and shop windows and this is found to be particularly so in the case of flashing beacons. The continuously lighted beacons appear to be the most popular.

One individual comment of interest came from a lorry driver who spoke favourably of the flashing amber light high up on a pole on the central island as he found he was able to see this clearly from his high driving seat, whereas the lower lights were frequently obscured by other traffic.

Pedestrians naturally agreed that the lighting made the crossings safer though it is understood that motorists find that pedestrians still step off the pavement too quickly.

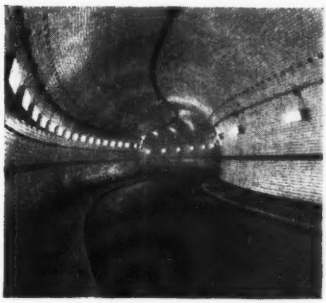
No doubt after the full month's trial some useful information on the lighting and indicating of pedestrian crossings at night will be obtained which will help to make the crossings more effective.

Lighting in Blackwall Tunnel

Blackwall Tunnel, between Poplar and Greenwich, was constructed in 1897. Although electric lighting was installed, it was, of course, designed for the prevailing conditions, i.e., slow-moving, horse-drawn traffic. Electricity was supplied from a small power station situated at the tunnel. The last important revision of the lighting was in 1930.

The complete banning of horse-drawn vehicles in 1939, the resulting higher average speed of traffic and the increased size of vehicles have made further improvement necessary. Experiments were made with different types of lighting and the views of road users and other interested parties were obtained, as a result of which the L.C.C. in 1949 decided to undertake the complete relighting of the tunnel at an estimated cost of £30,000. The first section (at the Poplar end) is now in operation.

Tunnel lighting presents certain difficulties which are not present in ordinary street lighting. Drivers may plunge suddenly from brilliant sunlight to comparative gloom and their eyes require a few seconds



View from northern entrance down the tunnel, showing lighting on bends.

View inside the tunnel along a straight stretch.

to adapt themselves. It is not practicable, nor is it necessary, to illuminate the whole tunnel to daylight intensity, but the new lighting has been arranged so that it is more intense at the entrance where the fittings are sited closer on the outside of the bend.

A further difficulty in a narrow tunnel which is used continuously is that of maintenance. The existing lights are in the crown of the tunnel and require the use of a tower wagon in the middle of the road. This can only be done at night and even so causes some inconvenience to road users. The new lights are, therefore, positioned at the sides of the tunnel at a height which is a compromise between accessibility, effective lighting and clearance between the lights and passing vehicles. In this lowered position it is extremely important that no glare falls in the eyes of drivers.

To meet these conditions a special lighting fitting was designed by the L.C.C. chief engineer's department and 120 of these are now installed at the Poplar end of the tunnel. Each contains an 80-watt fluorescent lamp together with a set of louvres and control apparatus. Although not open to the sky, they have to be waterproof because the tunnel is cleaned with a hose. They are mounted on the tunnel walls at a height of 8 ft. 6 in. above the pavement. The normal spacing between fittings is 30 feet but at the entrance they are considerably closer. The illumination is about three times as great as that previously provided in the tunnel. It is entirely free from glare and in fact the effect is rather that of a series of illuminated windows than of street lighting fittings, serving as a guide line somewhat after the fashion of white lines painted on road surfaces.

It is interesting to note that each lamp is connected to the mains by a "fused" plug similar to that now in wide use in the wiring of houses. It is believed that this is the first time that this system has been used for an extensive lighting installation such as this. Its use has resulted in considerable simplification and economy in wiring.

Acknowledgment for kind permission to publish the picture on page 80 is made to the designer of the shop, Werner Heumann.

Correspondence

To the Editor, LIGHT AND LIGHTING

Dear Sir,—I have just been reading Mr. Besemer's interesting "Random Review of 1951" in the January issue, and should like to refer to his remarks about the National Illumination Committee. He writes: ". . . the National Illumination Committee has again provided for five of its seven offices to be held by two gentlemen, one of whom is in the gas industry and the other in a company concerned with both gas and electric lighting." The fact is that there are only five offices in the N.I.C., and these are held by four members. Mr. Besemer has apparently reckoned as officers the two representatives of the Committee on the Executive of the International Commission. For a very long time past it has been the custom (not a rule) of the Committee to ask its two Vice-Presidents to act as its representatives on the international body, probably on the principle (now being followed by the C.I.E. itself) that vice-presidency should not be a sinecure.

So much for the facts, but I should now like to join issue with Mr. Besemer on a matter of principle. I cannot agree that the officers, or C.I.E. representatives, represent any particular industry or other interest. The Committee is itself formed of such representatives, but for officers and for international representation the only basis of selection should be, and I believe is, those qualities and standing in the lighting world which will uphold the prestige of the Committee both nationally and internationally. Mr. Besemer is, of course, entitled to his opinion, and I am very glad that he has voiced it. Whether it is shared by the members of the N.I.C. in general will appear when the Committee appoints its officers and its members of the C.I.E. Executive for the period ending after the next session of the Commission.—Yours, etc.,

J. W. T. WALSH,
Chairman, N.I.C.

Teddington.
January 10, 1952.

The Editor, LIGHT AND LIGHTING

Sir,—I was very interested in an article in the January issue of your journal, entitled "Modern Lighting in a New House," the architect being Mr. G. Grenfell-Baines.

I have myself recently completed a house with a certain amount of fluorescent lighting in it, the lounge being lit by four 40-watt 2-ft. tubes. The net result of this was that we could not listen to a radio programme satisfactorily in the lounge with the original aerial equipment that would have been satisfactory had the lighting been of the metal filament type. It was not until all the fittings in the house had been fitted with special suppressors, as used on the fluorescent lighting at the National Radio Show, that it was possible to listen to a radio programme satisfactorily.

With approximately 35 fluorescent fittings in the house described in the article, radio interference must be colossal, and it would be interesting to know whether any special steps were taken to reduce this nuisance.

The vendors of the fittings which I purchased for my house naturally claimed that they were interference free but, on further investigation, it appeared that they did not know what they were talking about. It is a warning to anybody buying fluorescent fittings for domestic use that an additional allowance has to be made for proper interference suppression and it does, of course, increase the cost of the installation considerably, particularly so if the suppressors are not fitted until after installation is completed.—Yours, etc.,

A. J. MARE.

Birmingham.

[*We understand that all the lighting fittings in the house described in our January issue have the normal radio suppressor fitted in the starter switch canister or in the appropriate position in the circuit where instant start lamps are used. These are of the usual* 0.02 *mfd. type. There is no noticeable interference with radio reception in any of the wave bands—short, medium or long. The wireless set itself stands on a cabinet underneath the illuminated panel between the lounge and the hall (see picture at the bottom of p.* 19). *A* 40*-watt lamp is three feet from the receiver. At normal gain on the receiver there is no noticeable interference even from this lamp by direct radiation from the tube, and the tube is completely unscreened.*

It is possible that in the job mentioned by Mr. Mare there was something peculiar about the arrangements; possibly the set was not earthed or was not fitted with the normal amount of suppression on its power unit.

As a matter of interest we would mention that we have heard of other instances where both radio and television receivers operate quite successfully within a few feet of fluorescent lamps fitted with standard suppressors.—ED.]

The Building Centre

The Building Centre has recently moved into new premises at Store Street which offer better facilities for the exhibition of equipment.

Lighting engineers should welcome any opportunity offered them to learn to appreciate the everyday problems of the architect and builder even though such matters might have no direct bearing on lighting. If lighting engineers hope to speak to architects in their own language they must learn the language first. One step in this direction is to visit the Building Centre which offers a permanent exhibition of the equipment used in the lighting, heating, decoration, etc., of buildings and shows the most up-to-date products connected with building services.

The Building Centre has no financial interest in sales, and it is not possible to purchase or give orders for goods at the Centre, but visitors can see and obtain information on what the manufacturer has to offer in the way of new materials, new ideas, etc., besides a very wide range of standard materials such as timbers, marbles, stones, and so on.

Manufacturers exhibiting at the Centre are obviously unable to show a complete range of their products, but the samples shown are, generally speaking, sufficient introduction of the type and quality of the goods they produce. As these are constantly being changed users of the Centre have a unique opportunity of keeping in touch with all the latest inventions and newest products. Every exhibit is labelled with the name of the manufacturer, who is required to provide standardised sheets giving full information for distribution to inquirers. These sheets are obtainable at the inquiry bureau. All inquiries are treated as confidential, but visitors may, if they so wish, be put into direct communication with manufacturers.

The Building Centre maintains its own

technical staff, who are prepared to give unbiased information and assistance, but not to advise on architectural or building practice. No opinions, favourable or otherwise, are expressed, but information can be given as to where various materials and equipment have been used so that those interested may make their own inquiries as to their performance. Reports on such official tests as may have been carried out are also available. The technical staff is in constant contact with various research bodies such as the B.R.S. and other branches of the D.S.I.R. besides Development Associations dealing with specialist problems.

(*Right*) *The information desk on the ground floor.*

(*Below*) *The Council Room.*

Fittings in Modern Materials

The new range of G.E.C. fittings described below has been designed in keeping with contemporary ideas for interior furnishing.

Some of the range of G.E.C. contemporary fittings.

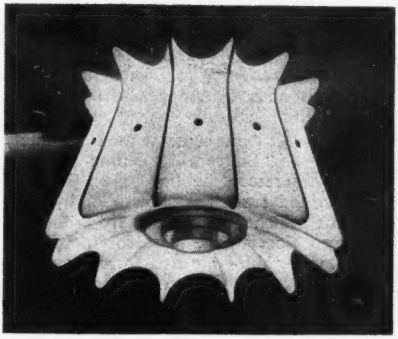
New materials, new techniques, new trends in architecture and in interior and furniture design all have an important influence on the style of lighting fittings. The extent of this influence may be gauged from the latest fittings to emanate from the G.E.C. Fittings Design Office which are now on display in the company's showrooms at Magnet House, Kingsway, W.C.2. They are forerunners of a wider range which is still under development.

The new range of fittings, which is a British interpretation of the contemporary trend in design, combines aesthetic appeal with maximum illuminating efficiency at a cost within reasonable reach of the average householder. The designers have avoided the austerity of line which has characterised many contemporary lighting fittings, and have introduced an element of warmth and human appeal which make them suitable for the home, for hotels, restaurants, cinemas and other public buildings. All these designs were submitted to the company's overseas organisation throughout the British Commonwealth, and were enthusiastically received.

Since variety is a vital consideration in a range of articles whose purpose is mainly decorative, a well-known device is being adopted—the manufacture of standardised components, in different finishes, to provide a number of interchangeable parts which can be assembled in several combinations to form a wide range of fittings. Many different materials lend themselves to such treatment. For instance, the top shade of a fitting may be glass, pleated buckram, plastics or metal (e.g., anodised aluminium), while the diffuser enclosing the lamp may be pleated buckram or paper, plastics or glass. The flexibility in design that this system allows is a useful asset at a time when the supply of materials is erratic and unpredictable.

The use of perforated metal spinnings as

reflectors is an innovation in this country. The perforations serve a purpose distinct from their decorative function in lessening ceiling shadows and enhancing the appearance of the fitting. The reflector admits of variation in that it can be sprayed in several colours. It is also possible to invert a perforated metal spinning, spray it with "Chrysaline," and use it as indirect lighting reflector.



(Above) "Chrysaline" ceiling fitting. (Left) Other fittings in the new range.

The G.E.C. designers have not been afraid where necessary to accept traditional ideas as the basis of their inspiration.

"Chrysaline" is a recently introduced plastics material which can be spun in cocoon fashion round a frame. Since the shape of the frames may be varied almost infinitely, the designer is free to roam over a host of shapes. Untreated or dyed, "Chrysaline" is a translucent material with the texture of parchment, and is an excellent light diffuser with very low light absorption. It can be sponged with soap and water for cleaning, and is equally suitable for indoor and outdoor use. It is tough and non-inflammable. Designs have been produced both for tungsten and fluorescent fittings. Interesting decorative effects may also be obtained by spraying "Chrysaline" with coloured flock.

New Lighting Showroom

Brief description of the new "Atlas" lighting showroom in London.

In their new lighting showroom at 233, Shaftesbury-avenue, W.C.2, Thorn Electrical Industries, Ltd., have attempted to give a comprehensive display of their incandescent and fluorescent lighting products in surroundings of contemporary style.

The initial planning of the showroom was complicated by the relatively small area available—about 1,200 sq. ft.—and the presence of columns. The manner in which these difficulties have been overcome and the variety of technical problems surmounted is a tribute to the architects, Messrs. Katz and Vaughan, and the company's engineers and technicians.

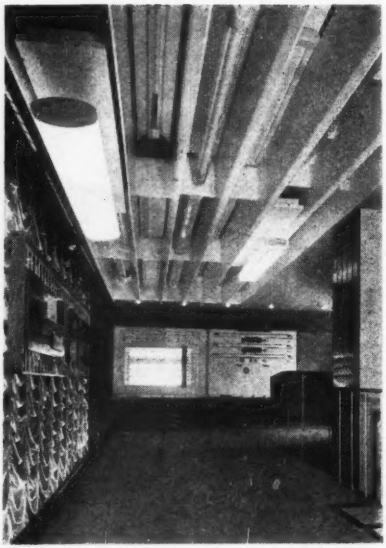
In plan the showroom comprises a central area bordered on two sides by a platform

2 ft. high which serves to segregate the different sections without breaking up the showroom by partitions. Polished mahogany panelling on backgrounds and surrounds adds to the general atmosphere of warmth.

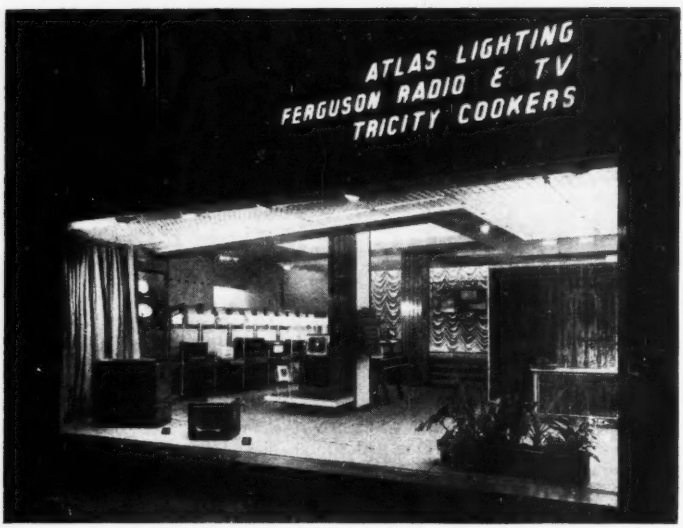
On the left is the window area illuminated through a "Louverall" ceiling by twin 80-watt fluorescent lighting units. This area is separated from the showroom by drape curtains which can be entirely withdrawn, arranged close to the glass for the purpose of extending the floor area for a special display or for window dressing, or drawn between the window display and the showroom. A three-inch-high window platform can be used for window displays and accent lighting is provided by internally silvered spotlights located above the "Louverall" ceiling.

Over the rear platform is a most effective and original method of demonstrating a large range of fluorescent lighting fittings. Twenty-six fittings lie concealed from view between a series of ceiling baffles. At the touch of a switch any one of these units slides into view beneath the baffles, lighting up automatically as it does so. This display can be controlled either from the main switchboard in the central area or from a secondary board on the platform.

The ceiling above the central area is illuminated by concealed "Atlas" coloured fluorescent lamps controlled from the central switchboard and with which many beautiful indirect colour-lighting effects can be obtained.



End-on view of the fluorescent fittings gallery with two fittings in the display position.



Interior view of the showroom at night.

I.E.S. ACTIVITIES

Brains Trust Meeting in London

A Brains Trust meeting is to be held at the L.S.B. at 2, Savoy Hill, at 6 p.m. on Wednesday, March 26. The names of the team were announced in the last issue; the Question Master will be Mr. Kenneth Horne, of radio fame. Questions for the attention of the team should be sent to the I.E.S. Secretary as soon as possible. Opportunities for supplementary questions will be given at the meeting.

Visit

A visit will take place on the afternoon of April 23 to the Amalgamated Press, Ltd., at Sumner Street, London, S.E.1, to see colour-printing operations. Those wishing to take part should apply to the I.E.S. Secretary.

London

At the Sessional Meeting in London, on February 12, a paper entitled "The Specification and Testing of Fluorescent Lighting Fittings and Components" was given by G. Fahey, D. T. Waigh and W. R. Bloxsidge.

In this paper the preparation of specifications and methods of test for fluorescent lamps, control gear and fittings was discussed. The characteristics of each component and the factors which vary their performance were considered at first separately, and then when they are combined to form the luminaire or complete lighting unit. The performance of each may vary if the combination produces a change in the individual operating conditions.

The performance of a fluorescent lamp is varied by several factors and their effect on striking volts, running volts, amps., watts, lumens per watt, colour and life was considered, bearing in mind that in certain circuits relative humidity and adjacent earth may affect the lamp striking volts. Curves showing the effect of ambient temperature on lamp efficiency, running current, voltage and wattage, were also included. The most important factor of all is the choke; if it is to be used for testing lamps it should be specified within close limits based on the requirements of a group of lamps which together provide all the characteristics of an "ideal" lamp. This is the "standard" choke which, with the "ideal" lamp, will provide data from which limits can be set for production choke performance in terms of choke characteristic and lamp-operating conditions.

Methods of test were described. Lamp life data can only be obtained with any accuracy by testing a large number of lamps (of the order of 100), as in practice if smaller numbers are taken concessions on the number of failures are necessary. Included in the paper was a table showing the probability of passing batches of lamps with different proportions of defective lamps (i.e., failures before half-declared life) for varying numbers of lamps in the test group.

The use of the "ideal" group of lamps for testing chokes is laborious. In addition, the existence of a lamp in a choke "test circuit" introduces a further variable to the test, thereby making it unsatisfactory as a test for choke design characteristics and performance. Methods of test were described and pass limits suggested for chokes, capacitors, and types of starting device.

The fitting should provide satisfactory operating conditions for lamp and control gear. For the fluorescent lamp approximately 80 per cent. of its running watts appear as heat, more watts being dissipated in the lamp enclosure than in the control gear enclosure. The results of tests to obtain an empirical guide to the relation between enclosure volume and temperature rise was given in the paper.

In conclusion, the following recommendations were made by the authors: (a) Average lumen output figures should be based on a bare lamp operating at nominal watts in free air at 20 degs.; in addition the corresponding lamp wall operating temperature at top centre of the lamp should be stated; (b) fittings manufacturers should state by what amount the lamp enclosures of their fittings will raise the free air lamp wall operating temperatures; (c) control gear should be temperature graded; the maximum permissible temperature of the air surrounding the control gear and of the outside of the choke container should be stated; (d) colours for lamps should be specified and named; this name should not be applied to any lamp whose colour does not comply with the specification; (e) the term

"luminaire" should be used to denote the complete lighting unit.

Papier Mâché

The Informal Meeting in London on January 23, when the I.E.S. Papers Committee presented a dramatic fragment on how to write and present a paper appeared to be a most enjoyable occasion. The cast was made up of members of the Papers Committee, members of the I.E.S. office staff, Miss Wardlaw, from the L.S.B., and Mr. W. R. Stevens, who not only played the part of an author but also produced the show. The script was the work of Mr. Waldram, chairman of the Papers Committee.

The play opened with the I.E.S. Secretary busy preparing proofs for the printers and expressing despair over a newly received manuscript with an abandon that he must seldom be able to exercise in practice. The scene then changed to a meeting of the Papers Committee where the fate of the

Scene from "Papier Mâché," showing the harassed Secretary and his Assistant working "under difficulties."

The Papers Committee in session—another scene from the "technical morality" presented recently in London.

MS. is decided after consideration of the referees' reports. Next we saw the editor burning the midnight oil at home getting the MS. into shape for the Transactions. Then came an insight into the author's home where the author is discovering for himself some of the things which can upset the presentation of a paper; things which he has put right by the next scene where he is delivering his paper at a sessional meeting with every confidence. And the last scene of all was where the author receives from the hands of the President the Leon Gaster Memorial Award for his paper "so felicitously presented" and which "added lustre to our Transactions."

After each scene one of the actors came in front of the curtain to point the moral. The discussion following the presentation lasted for just over an hour and a number of speakers laid additional emphasis on the points put over by the Papers Committee. The functions of the referees and the editor were discussed at some length and it was generally agreed that they were out to help the author as much as possible. A number of speakers agreed that having first written his headings and clarified his ideas as to what is to be included in the paper the author should then write his first draft and forget it—the second effort will be much better. On the preparation of the MS. it was pointed out that there were a number of publications and the I.E.S. Notes for Authors to which an author should refer in order to ensure that his MS. is properly laid out and his illustrations in a reproducible form.

The meeting showed what happens between the time a MS. is received and the time it eventually appears in print, explained why various things have to be done and gave some useful hints to authors. Perhaps after this meeting prospective authors will take heart and produce the flow of papers that the I.E.S. so badly needs.

Birmingham Centre

There was a very good attendance of members and guests when the Birmingham Centre held their annual dinner on January 11. The speeches after the dinner were opened by Prof. P. B. Moon, Poynting Professor of Physics at Birmingham University, who said that the objects of the Society had a great appeal for him as a physicist. Light, in his opinion, was the most attractive branch of physics. He thought that those who put it to practical use were most versatile people and he mentioned how developments in light sources had been applied to much fundamental research such as the use of flash discharges in atomic research.

Mr. R. A. Lovell, Chairman of the Birmingham Centre, with Mr. J. G. Holmes, President, I.E.S., at the recent Birmingham Centre dinner.

The President, Mr. J. G. Holmes, in his reply recalled that he was himself a past-chairman of the Birmingham Centre and in fact the first to hold such an office to become the President of the Society. He referred to the work of the Society in lighting education and asked that members of the Centre give every encouragement to students to enter the Dow Prize Competition.

Mr. R. A. Lovell, chairman of the Centre, proposed the toast of the guests, the reply being made by Mr. F. W. Lawton, divisional controller of the B.E.A. Mr. Lawton congratulated the lighting industry on the great and steady increase in efficiency of light sources which they had achieved during recent years, an increase which had more than counteracted the increased cost of energy.

On January 4 the Birmingham Centre had a joint meeting with the Institute of Road Transport Engineers when a very interesting paper on "Modern Transport Lighting" was presented by Mr. E. G. Wotton. The paper dealt mainly with the application of hot cathode fluorescent lamps to the lighting of tramcars, buses and coaches, electric and steam trains.

The author gave a brief résumé of lamp characteristics when used with A.C. or D.C.

Mr. L. H. Hubble demonstrating lighting equipment after a lecture to L.C.C. school children.

supplies and stressed the point that if generating equipment was to be installed it should be A.C. and not D.C., owing to several important disadvantages of the latter. He then went on to describe various methods of starting and running the lamps and said the three main reasons for preferring A.C. to D.C. were:—(1) No cataphoresis (migration of the mercury); (2) No resister as a ballast component; and (3) Convenient starting of the lamps without the use of starter switches.

He next considered the effect of frequency. As the frequency of the supply increases, the efficiency of the lamp increases and the voltage decreases. High frequencies of 400 to 1,000 c/s also favoured the components used in the circuit inasmuch as the choke and condenser can be reduced in size with closer tolerances in manufacture.

In dealing with the available supply of current, Mr. Wotton pointed out the difficulties, instancing the almost universal use of D.C. at voltages ranging from 24 up to 500-600, and with fantastic variation. The exception was the 110-volt supply sometimes generated by a separate small machine. A 550 volt supply may vary between 390 and 750 volts which necessitates a barretter ballast to ensure a fairly constant lamp current.

Quite often this ballast was a tungsten lamp which could be used to light destination indicators. Special devices have been introduced to restrike lamps rapidly where temporary interruptions to the supply are caused by cross-overs and line gaps. For train lighting it was becoming usual to instal a separate motor alternator operating from the track to provide a convenient source of A.C. for lighting. This was often a dual purpose machine, also providing 50-100 D.C. supply for train auxiliary services.

On 24 volt D.C. a special motor alternator had been designed giving 110 volts A.C. at 400 c/s and which ensured substantially constant lamp current over a supply voltage range fom 18 volt to 32 volt and using one to 38 20-watt fluorescent lamps. Mr. Wotton also dealt with the use of vibratory converters.

In dealing with lighting practice he compared the efficiency of fluorescent lamps and tungsten lamps and showed a number of slides illustrating modern practice.

A vote of thanks was proposed by Mr. Wade, of the I.R.T.E., and seconded by Mr. V. Heydon.

Stoke Group

The fourth annual dinner of the Stoke Group was held at the Borough Hotel, Newcastle, Staffs, on Friday, January 25, 1952. It was particularly unfortunate that illness prevented the chairman, Mr. R. F. Squire, from presiding, and the vice-chairman being also indisposed, Mr. Thomas Lockett, O.B.E., the immediate past chairman, presided.

The principal guest was Mr. D. F. F. Brewester, City Surveyor of Stoke-on-Trent, who proposed the toast to the Society. He suggested that the standard of street lighting adopted was to some extent indicative

Forthcoming I.E.S. Meetings

LONDON

March 11th

Sessional Meeting. "Lighting in Shipyards," by J. S. McCulloch. (At the Lighting Service Bureau, 2, Savoy Hill, W.C.2.) 6 p.m.

March 26th

Informal Meeting. Brains Trust. (At the Lighting Service Bureau, 2, Savoy Hill, W.C.2.) 6 p.m.

CENTRES AND GROUPS

March 4th

CARDIFF.—Electrical Association for Women Quiz on Electrical Problems in the Home. (At the Town Hall, Newport, Mon.) 5.45 p.m.

LIVERPOOL.—"Lighting and Safety in Factories," by L. C. Rettig. (Joint meeting with the Association of Production Engineers, Factory Inspectors, and Works Managers' Association.) (At the Lecture Theatre, Merseyside and North Wales Electricity Board's Service Centre, Whitechapel, Liverpool.) 6 p.m.

STOKE-ON-TRENT.—"Interior Decoration and Its Influence in Illumination," by Gordon Ellis. (At 31, Kingsway, Stoke-on-Trent,) 6 p.m.

March 5th

NEWCASTLE.—"Colour and Light," by Gordon Ellis. (At the Minor Durrant Hall, Oxford Street, Newcastle-on-Tyne, 1.) 6.15 p.m.

March 6th

NOTTINGHAM.—"Invisible Radiations from Illuminants," by B. S. Cooper. (At the Demonstration Theatre, East Midlands Electricity Board, Smithy Row, Nottingham.) 5.30 p.m.

EXETER.—"Sodium Lamps and their Applications," by A. W. Gostt. (At the Providence Hall, Northernhay Street, Exeter.) 7 p.m.

March 7th

BATH AND BRISTOL.—"Sodium Lamps and their Applications," by A. W. Gostt. (At the South Western Electricity Board, Lecture Theatre, Old Bridge, Bath.) 6.15 p.m.

HUDDERSFIELD.—"Railway Signalling," by G. G. F. Halliwell. (At the Electricity Showroom, Market Street, Huddersfield.) 7.15 p.m.

March 12th

EDINBURGH.—Short Papers and Annual General Meeting. (At the Welfare Club Hall, 357, High Street, Edinburgh.) 7 p.m.

March 13th

LEICESTER.—"Sports Lighting," by M. W. Peirce. (At the Demonstration Theatre, East Midlands Electricity Board, Charles Street, Leicester.) 6.30 p.m.

MANCHESTER.—"The Performance of Vehicle Headlights on the Road," by A. G. Harris. (At the Demonstration Theatre, Manchester Town Hall, Extension.) 6 p.m.

March 14th

BIRMINGHAM.—Annual General Meeting. "The Physical Principles Governing Fittings Design," by W. H. Willott (At the Imperial Hotel, Temple Street, Birmingham.) 6 p.m.

March 17th

SHEFFIELD.—"Colour," by W. J. Wellwood Ferguson. (At the Medical Library, The University, Western Bank, Sheffield, 10.) 6.30 p.m.

March 20th

GLASGOW—Annual General Meeting. Presidential Address by J. G. Holmes and Annual Dinner.

BRADFORD—"Black Light, its Effect and Application," by H. L. Privett. (At the Yorkshire Electricity Board, 45–53, Sunbridge Road, Bradford.) 7.30 p.m.

March 21st

EDINBURGH—Annual Dinner and Social. Visit by President.

GLOUCESTER and CHELTENHAM—Film Show. (At the General Electric Co., Ltd., St. Aldgate Street, Gloucester.) 6.15 p.m.

March 28th

BIRMINGHAM—"Light and Colour," by G. J. Chamberlain. (At the Imperial Hotel, Temple Street, Birmingham.) 6 p.m.

March 31st

LEEDS—"Light and Sight," by J. Benson. (At the Lighting Service Bureau, 24, Aire Street, Leeds, 1.) 7 p.m.

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of the degree of civilisation or social progress reached, and quoted examples in various parts of the world. Mr. Brewester went on to refer to the improvements in street lighting which were being carried out in Stoke-on-Trent, particularly to the scheme now nearing completion for mercury vapour street lighting throughout the main route through the city from north to south and to the standard of lighting being adopted on the new housing sites of the Stoke Corporation.

In the unavoidable absence of the president of the Society, Mr. L. C. Rettig, one of the vice-presidents, responded to the toast. He referred to the vast field of activity of the Society and of its importance as a co-ordinating body for members and other bodies dealing with all applications of artificial and natural lighting. He also referred to the scheme for the registration of lighting engineers, and made an appeal for support of the Society by all interested in lighting.

Mr. R. A. Lovell, chairman of the Birmingham Centre, also responded to the toast, and referred to the recent accident at Chatham as showing the necessity for greatly improved street lighting. He suggested that this was a challenge which the community must meet and that the Society had a part to play in helping to secure better and safer lighting of streets and transport vehicles.

The toast to the Visitors was proposed by the chairman, and responded to by Mr. F. Jamieson. Other visitors included Mr. W. J. P. Watson, secretary of the Birmingham Centre, and Mr. J. R. Piggott, City Architect, Stoke-on-Trent.

Obituary

K. R. MACKLEY

It is with deep regret that we announce the death, on February 9, after a long illness, of Mr. K. R. Mackley. Ken Mackley was manager of the Liverpool branch of Cryselco, Ltd. He joined the company in Manchester in 1928 and opened the Liverpool branch in 1930.

He was largely responsible for the formation of the Liverpool Centre of the I.E.S. in 1944, and it was due to his enthusiastic guidance as honorary secretary that the Centre grew and increased its activities year by year. He was well known and liked throughout the Society and the lighting industry and was a member of the I.E.S. Council. We extend our sincere sympathy to his widow.

A New Tubing Plant

The Chance Brothers Vello Tubing Plant at Firhill, Glasgow, is a dollar-earning and dollar-saving project which will make Britain self-supporting in glass tubes for fluorescent lighting. Up to now, not enough tubes for this purpose have been produced here and supplies have had to be imported, mainly from America. The output from the new plant will more than fill the gap, so that export markets can be fed as well.

The plant is unique in the United Kingdom. The principles on which the Vello process is based were conceived in France and developed in America by the Corning Glass Works. The installation of the plant in Glasgow has been achieved by co-operation between British and American skilled glassworkers and engineers.

Although most of the original designs for the process machinery were American, they have been adapted by the engineering staff of Chance Brothers, who also designed the furnace which makes the glass. All the machinery was made by British firms and some of it was designed and constructed by Chance Brothers' engineering department.

The new plant is fully automatic. The glass is made in a furnace capable of producing 250 tons a week. From the furnace glass flows through a channel some 24 ft. long, where it is automatically controlled to pre-determined temperatures. This ensures that the glass is maintained to the tube drawing mechanism in the correct condition. The hot glass then passes through a metal annulus consisting of an inner funnel known as the "bell" and an outer cylinder known as the "ring." Air is blown down a hollow shaft through the bell to inflate the glass and to keep it in tubular form.

At this stage, the diameter is considerably greater than is required in the finished article. The glass tube, still soft, initially falls vertically. The moving tube is stretched so that its diameter continues to reduce without distortion of the circular section, and at the same time, it is turned through a curve (called the catenary) into a horizontal position, the complete change being accomplished in about 20 ft. The glass then moves over its horizontal runway as a continuous tube until it is cut into the required lengths by an ingenious "hot-cut" machine, which first heats a narrow band of glass and then severs it by chilling. Each tube then falls on to a conveyor belt and moves through a machine which automatically measures its diameter and rejects any tube of incorrect dimensions.

The tubes are then raised to the processing floor, where the ends are cut to precise lengths and smoothed in a flame. Where required a special machine automatically shapes both ends of the tube. The tubes are then packed in cartons, in which they are supplied to the customer.

SITUATIONS VACANT

DRAUGHTSMAN required with experience in coloured perspective drawings for electric light fittings manufacturers.—Write F. H. Pride, Ltd., 81, Clapham High-street, S.W.4.

LIGHTING ENGINEER required for London Office of Thorn Electrical Industries, Ltd. Experience in preparing industrial and commercial schemes essential. Excellent prospects.—Apply in confidence to Dr. H. H. Ballin, Thorn Electrical Industries, Ltd., 105, Judd-street, W.C.1.

DRAUGHTSMAN and JUNIOR DRAUGHTSMAN required by specialist lighting manufacturers in Central London. Five-day week. Salary scale depending on age and qualifications.—Box No. 827.

LABORATORY ASSISTANT wanted in a well-equipped Photometric Laboratory, for routine and development work, in London.—Box No. 828.

LIGHTING REPRESENTATIVE required with sale ability and sufficient technical knowledge to enable him to stimulate interest in large fluorescent installations and discuss technical aspects with Lighting Consultants, Architects, etc. London area. Own staff know of this advertisement.—Write, giving full particulars in confidence, to Box No. 829.

LIGHTING ENGINEER required. Full technical knowledge essential and must be accustomed to preparation of fluorescent lighting schemes. Excellent prospects. London district. Own staff know of this advertisement. Replies treated in strict confidence.—Box No. 830.

SITUATIONS WANTED

ELECTRICIAN, aged 28. Avail. Mar. 24 onwards. Nat. cert. City and Guilds Elect. Installations, and Illuminating Eng. (Int.). requires progressive position. Apprenticed Metro-Vick.—Box No. 831.

Registered LIGHTING ENGINEER (I.E.S.). First-class C. and G. Inter. Cert., over 10 years' experience lighting laboratory, requires change of situation, London area.—Box No. 832.

FOR SALE

DIESEL GEN. SET for sale. Petter 3 cyl. 168 B.H.P. engine, 410 r.p.m. B.T.H. 160 Kw. D.C. generator, 230 volts, 696 amps. 325 r.p.m. M.D. Compressor. 3 phase.—Full details, photo. F. J. Edwards, Ltd., 359, Euston-road, London, N.W.1. EUSton 4681.

REVIEWS OF BOOKS

"The C.I.E. International Colour System Explained," by G. J. Chamberlin. The Tintometer, Ltd., Salisbury, 1951. Price 5s. 34pp., 18 illustrations.

This book is one of a series of non-technical books recently produced by Tintometer, explaining the fundamentals of colour measurement. It is not directly concerned with the instrumental side of measurement but it explains how the visual appearance of a coloured material can be precisely described in the terms of X, Y and Z, which are the coefficients of the C.I.E. International Colour System. It starts off with a very necessary description of the difference between additive and subtractive mixture of colours, illustrated by coloured plates, and then develops the idea of the colour triangle and the use of three-co-ordinate geometry. The rather complex mathematical transformations which sometimes cause confusion in the C.I.E. system are simply and fairly accurately illustrated by some humorous and highly practical drawings, and throughout the booklet care is taken that the intelligent reader shall not be blinded by science. The rather mathematical parts of the argument are relegated to two appendices and there is a useful set of references for further reading of a more technical nature.

"Photoelectric Tubes," by A. Sommer, D.Phil., A.M.I.E.E., Methuen & Co., Ltd. Price 8s. 6d., pp. 118, 27 figures.

With the introduction of the second edition of his book on Photo-electric Cells, Dr. Sommer has changed the title to Photo-electric Tubes. He has thus widened or, at least, clarified the scope to include photo-emissive tubes of all kinds and made it clear that photo-voltaic and photo-conductive cells are not included.

In the new edition new material has been added on multiplier cells, image convertors and other features of modern television techniques. Like the other authors in Methuen's Series of Monographs on Physical Subjects, Dr. Sommer writes with the authority of a research worker who has made his own contributions to the subject. We can thoroughly recommend this little work. J. N. A.

"The Conduction of Electricity Through Gases," by K. G. Emeleus, M.A., Ph.D., Methuen & Co., Ltd. Price 5s. 6d. pp. 99, 37 figures.

The third edition of Dr. Emeleus's monograph includes references to some of the more recent works on new probe techniques and the application of high frequency to investigations on the phenomena of electrical conduction through gases.

This well-known work can be confidently recommended not only to students of science at degree level, but also to all those whose interest in the subject is either general or specific. The exposition is clear at all times and the treatment of each section is that of an author who has made a name for himself in the subject on which he writes. J. N. A.

"Principles of Lighting," by W. R. Stevens. Pp. 482 + x 200 figs. (Constable and Company, Ltd., London. Price 35s. net.)

Those who looked for an outstanding book on illuminating engineering from Mr. Stevens will not be disappointed. It is, in fact, difficult to praise it too highly. As one might, perhaps, expect from the author's wide experience in both the more theoretical and the practical aspects of lighting, the book is a thoroughly well-balanced treatment of the subject from all angles. He suggests that it it may help the student who is preparing for the more practical side of the City and Guilds Examination in Illuminating Engineering at the advanced level, and it would be difficult to conceive a more suitable book for the purpose. There is a marked absence of woolly generalities but instead a wealth of straightforward guidance from someone who has not only the knowledge but also the ability to "put it across." Each chapter is completed with a select bibliography drawn impartially from all sources, and every illuminating engineer in this country will wish the book an extensive circulation on the other side of the Atlantic where, so frequently, authors seem to be quite unaware of any work published outside the borders of the United States. The production of the book is excellent, and there is a large number of half-tone illustrations of good examples of lighting, again drawn from all over the world. The book should be of immense value, not only to students of illuminating engineering, but to the large and growing number of engineers, architects and others who are aware of the importance of good lighting and who are looking for a text-book which will give them more detailed and complete information than can be got from the literature available to them hitherto. A good index completes a remarkably good book. J. W. T. W.

POSTSCRIPT

By "Lumeritas"

Since my last postscript was penned, we have been saddened by the death of King George VI. Untrained for kingship, he rose splendidly to the occasion when, unexpectedly, he was called to the Throne. He gave himself unsparingly to the tasks laid upon him and, conquering handicaps by assiduous effort, he earned the respect and admiration both of his own and other peoples. History will say well of him. Our new Queen is already beloved throughout her wide realm. She will have the good wishes of us all for a long and happy reign. It may be that in the new Elizabethan age, and in no small measure through the influence of, and the example set by, Queen Elizabeth and her united peoples, the nations of the world will come to compose their differences peacefully and reasonably, to the great good of all.

Last month I mentioned the experiments which are being made in lighting Zebra crossings. The methods being tried include floodlighting, continuously illuminated beacons, flashing-light beacons, flashing amber lights of the traffic signal type, and flashing-light road studs. Opinions differ as to the efficacy of these different devices. After seeing them I give my vote to the flashing beacon, though, in addition to this, I think crossings should be sited near to street lighting standards as far as possible.

At the Oxford inquest recently on a woman fatally injured in a road accident at night, the coroner remarked: "It may be that if one headlight had been in use this woman would not have been killed, and that a great many similar accidents would not have occurred if there were an accepted principle that motorists should have one headlight on." The driver of the car by which the woman was hit said he was unable to see her soon enough because she was in a shadow. The coroner's remarks were prompted by this statement, together with the similar circumstances in which the terrible Chatham accident occurred. The Chatham accident has been reported in the foreign Press, and I have received from Ernst Rebske, a member of the German Illuminating Engineering Society, a letter with a photograph, which the report prompted him to take, showing how road surface inequalities can produce dark areas in lighted streets. Now there are relatively dark areas on a great many roads equipped with lighting installations which numerous motorists seem to think are good enough to make the use of a headlight unnecessary, and even offensive to other road users. But if, and when, any part of the road near ahead cannot with certainty be seen to be clear, it is plainly the duty of motorists to illuminate it adequately by their own lights. The sooner this is universally recognised by motorists the better.

Of course, it is also the duty of pedestrians to look out for the lights of approaching vehicles. Even when these lights are not good enough to reveal the pedestrian to the driver, they are likely to warn the watchful pedestrian of the approach of the vehicle. The Chief Constable of Nottingham has been criticising careless and stupid pedestrians who cross the road with their backs to oncoming traffic or "with their eyes at their feet." Certainly the onus of seeing should not be on the vehicle driver alone.

In this country there are not very many windowless factories, though a few were built during the war, when it was essential to prevent any escape of light while work was in progress during the hours of external darkness. But there are working places in many factories which are virtually windowless. In the United States, I believe, windowless factories have been built for other than defence reasons, but it appears that the International Labour Office has now complained about this practice. It is considered that the absence of windows involves greater danger to the occupants of such buildings in the event of fire or explosion, and also that the absence of outside views is depressing. It is certainly important to recognise that windows are generally expected not only to let in the light of day but also to let out the gaze occasionally. There is no difficulty in providing good lighting in windowless buildings, but the desire to be able to maintain visual contact with the outer world is very common and should not be thwarted unnecessarily.

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